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**LISTS OF SPECIES**

# Freshwater mussels of Catalão, confluence of Solimões and Negro rivers, state of Amazonas, Brazil

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**Abstract:** The present study provides a species list of freshwater mussels from Catalão, the meeting of the Solimões and Negro rivers, in state of Amazonas, northern Brazil. Expeditions to collect molluscs were carried out between 2004 and 2006, during high and low water seasons. Three hundred and thirty-one bivalve shells, 25 valves, and 57 live specimens of four families and 10 species were identified. A single exotic species, *Corbicula fluminea*, represented over half the collected shells. All bivalve shells were photographed and registered at the mollusc collection of the *Instituto Nacional de Pesquisas da Amazônia* (INPA), Manaus.

## Introduction

Documentation of the Catalão aquatic fauna has been carried out for some taxa. Anjos et al. (2008), collected 103 species of fishes. Freshwater mussels have not been cited for this region, probably due to the difficult access to these animals during most of the year. Mansur and Valer (1992), studying bivalves from the Branco and Uraricoera rivers in state of Roraima, and Pimpão (2007), studying mollusc species from the Madeira and Aripuanã rivers, in state of Amazonas, both mention the total absence of freshwater mussels during the high level water season (with the exception of some Sphaeriidae). Bivalves, usually buried and distant up to 15 m from the water surface, are inaccessible by manual sampling in high water season.

Species lists of Brazilian freshwater molluscs from the Amazon are rare despite of their high diversity (Simone 2006). This makes their identification difficult for non-specialist researchers and there may be more species yet to be described from the region. For example, Mansur and Pimpão (2008) described a new freshwater mussel from the Amazon basin, based on shell characters. We present herein the first illustrated list of freshwater bivalves from Catalão, in state of Amazonas to help non-malacologists and local students to identify them and to contribute to knowledge of this poorly studied fauna.

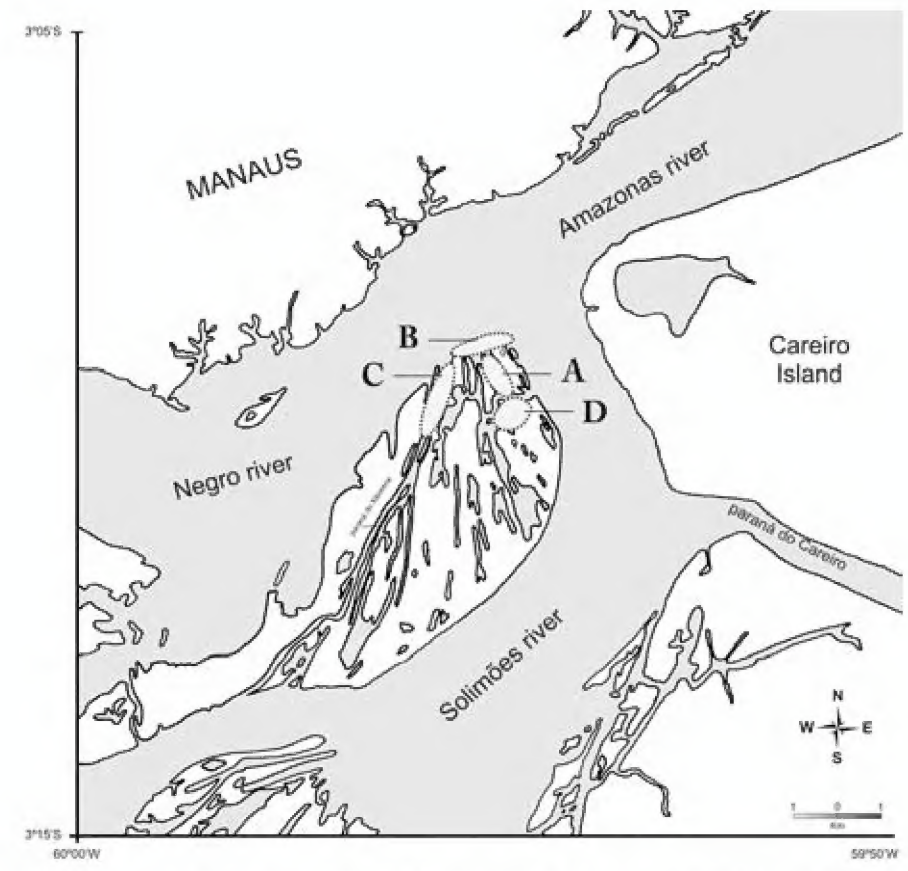


**Figure 1.** Map showing the location of Catalão and the four sampling points, municipality of Iranduba, state of Amazonas, Brazil. A. Exposed benthos near Catalão lake. B. Right bank of Negro river; C. Margins of Xiborena and Pirapora channels; D. Catalão lake, floating substrates. Modified from *Ministério do Exército, Depto. de Engenharia e Comunicação*, 1997, *Folha* AS.21-Y-CI MI-579.

## Material and methods

The Catalão area is located at the confluence of Solimões and Negro rivers (Figure 1), in the municipality of Iranduba, near Manaus, state of Amazonas, Brazil. This region is flooded annually

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by Solimões and Negro waters between April and August. According to Anjos et al. (2008) the area is influenced mainly by the white waters of Solimões river, which has a neutral pH, high electric conductivity and is loaded with suspended solids. The low water period occurs in October and November, when most of the freshwater mussels and/or their shells can be observed.

Field surveys were carried out at high and low water seasons between 2004 and 2006. The bivalves were collected manually from four sites: 1) exposed benthos near the water at Catalão lake; 2) the right bank of Negro river; 3) banks of Xiborena and Pirapora channels; 4) on floating tree trunks and *Eichhornia* spp. from Catalão lake. Live specimens were preserved in 70% alcohol and empty shells were washed and dried. All material was registered at the mollusc collection of the *Instituto Nacional de Pesquisas da Amazônia*, in Manaus. The description of shape of shells followed Mansur and Pereira (2006).

Material examined:

Family Mycetopodidae Gray, 1840

*Anodontites elongatus* (Swainson, 1823). Diagnosis: medium sized shell (8 cm length, 5 cm height), thick, shape oval elliptic and slightly inflated. Without intervalvar gap. External surface smooth, brown and opaque. Umbones low, eroded. Internal surface shiny; without pallial sinus. Hinge edentulous. Shell smaller, thicker and longer than *Anodontites trapesialis* and *Leila esula* shells. BRAZIL, Amazonas, Iranduba, Catalão, Catalão lake margins, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & D. C. Fettuccia col. (INPA 1124); Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 909); 07 November 2005, D. M. Pimpão col. (INPA 1451).

*Anodontites trapesialis* (Lamarck, 1819). Diagnosis: large shell (14 cm length, 10 cm height), thin, trapezoidal shape. Intervalvar gap on anterior ventral edge. External surface smooth and shiny, brown. Umbones low, eroded. Internal surface shiny; without pallial sinus. Hinge edentulous. Shell similar to *Leila esula*, but umbones lower, in more trapezoidal shape and without pallial sinus. BRAZIL, Amazonas, Iranduba, Catalão, Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 904); 07 November 2005, D. M. Pimpão col. (INPA 926); Xiborena channel, 03°09'08.0" S 59°55'24.7" W, 08 November 2005, D. M. Pimpão col. (INPA 929).

*Anodontites* (*Lamproscapha*) *ensiformis* (Spix, 1827). Diagnosis: medium sized shell (4 cm length, 2 cm height), very thin, elongated rhomboid shape with oblique posterior edge. Dorsal and ventral edges almost parallels. External surface smooth and opaque, brown. Umbones very low, eroded. Without pallial sinus. Hinge edentulous. Easily distinguished for other *Anodontites* by more elongated shape. BRAZIL, Amazonas, Iranduba, Catalão, Xiborena channel, 03°09'08.0" S 59°55'24.7" W, 08 November 2005, D. M. Pimpão col. (INPA 928).

*Mycetopoda siliquosa* Spix, 1827. Diagnosis: medium sized shell (4 cm length, 1.5 cm height), very weak and translucent, elongated elliptic to rhomboid shape with oblique posterior edge, truncated and almost straight. Dorsal and ventral edges almost parallels, ventral anteriorly oblique. External surface very smooth and shiny, light brown to yellow. Umbones very low, usually preserved. Without pallial sinus. Hinge edentulous. Distinguished from *Anodontites ensiformis* by weaker and translucent shell, yellow color and posterior edge truncated. BRAZIL, Amazonas, Iranduba, Catalão, right bank of Negro river, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & M. S. Rocha col. (INPA 1122); Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 906); Xiborena channel, 03°09'08.0" S 59°55'24.7" W, 08 November 2005, D. M. Pimpão col. (INPA 927).

*Leila esula* (Orbigny, 1835). Diagnosis: large shell (16 cm length, 12 cm height), thin, trapezoidal to discoid shape. Intervalvar gap on anterior ventral edge. External surface smooth and

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shiny, light brown to almost yellow on disc. Umbones not too low, inflated, usually preserved. Internal surface shiny; pallial sinus conspicuous. Hinge edentulous. Shell similar to *Anodontites trapesialis* but more rounded and umbones more inflated. Differs from *Anodontites* species by the presence of pallial sinus. BRAZIL, Amazonas, Iranduba, Catalão, Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 905); 07 November 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 925).

Family Hyriidae Swainson, 1840

*Castalia ambigua* Lamarck, 1819. Diagnosis: medium sized shell (5 cm length, 4 cm height), very thick, elongated triangular equilateral shape with posterior edge obliquely truncated. Dorsal edge curved. Posterior carina well evident, oblique. External surface having radial rows covering the disc or the whole surface; brown color. Umbones not too low, inflated and eroded. Deep umbonal cavity. Hinge with pseudocardinal and lateral teeth; lateral anterior short and posterior elongated. Distinguished from *Prisodon obliquus* and *Triplodon corrugatus* by lacking wings. BRAZIL, Amazonas, Iranduba, Catalão, right bank of Negro river, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & M. S. Rocha col. (INPA 1118); Catalão lake margins, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & D. C. Fettuccia col. (INPA 1123); right bank of Negro river, 03°08'56.3" S 59°55'04.7" W, 31 October 2005, D. M. Pimpão col. (INPA 917); 07 November 2005, D. M. Pimpão col. (INPA 921); Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 908); Xiborena channel, 03°09'08.0" S 59°55'24.7" W, 08 November 2005, D. M. Pimpão col. (INPA 930).

*Prisodon obliquus* Schumacher, 1817. Diagnosis: large shell (11 cm length, 6 cm height), thick, elongated triangular equilateral shape with anterior and posterior wings. Dorsal edge straight. Posterior carina evident, oblique. External surface smooth and shiny; light brown color. Umbones low, eroded. Shallow umbonal cavity. Hinge with pseudocardinal and lateral teeth; lateral anterior short and posterior very elongated. Distinguished from *Castalia ambigua* and *Triplodon corrugatus* by lacking external surface sculpture. BRAZIL, Amazonas, Iranduba, Catalão, right bank of Negro river, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & M. S. Rocha col. (INPA 1119); 03°08'56.3" S 59°55'04.7" W, 31 October 2005, D. M. Pimpão col. (INPA 914); right bank of Negro river, 03°08'56.3" S 59°55'04.7" W, 07 November 2005, D. M. Pimpão col. (INPA 920); 08 November 2005, D. M. Pimpão col. (INPA 934); Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 903).

*Triplodon corrugatus* (Lamarck, 1819). Diagnosis: medium sized shell (6 cm length, 4 cm height), thin but not so weak, high triangular equilateral shape with anterior and posterior wings. Dorsal edge straight. Posterior carina little evident, oblique. External surface having curved radial rows, chevron-like on the center becoming larger to ventral edge; yellow to light brown color. Umbones low, eroded. Shallow umbonal cavity. Hinge with pseudocardinal and lateral teeth; lateral anterior short and posterior elongated. Distinguished from *Castalia ambigua* by having no wings and from *Prisodon obliquus* by external surface sculpture. BRAZIL, Amazonas, Iranduba, Catalão, right bank of Negro river, 03°08'56.3" S 59°55'04.7" W, 07 November 2005, D. M. Pimpão col. (INPA 922); 08 November 2005, D. M. Pimpão col. (INPA 932).

Family Sphaeriidae Deshayes, 1855 (1820)

*Eupera simoni* (Josseaume, 1889). Diagnosis: shell very small (4 mm length, 3 mm height), thin, oval to ovoid shape. Dorsal edge soft curved. External surface smooth, shiny; light brown color, usually with dark spots in internal surface that can be seen externally. Umbones not too low and preserved. Hinge with cardinal and lateral teeth; small anterior and posterior laterals. Diagnosable by the spotted internal surface, very reduced size (no more than 10 mm) and substrata adhesion by byssus. BRAZIL, Amazonas, Iranduba, Catalão, Xiborena channel, 03°09'27" S 59°55'27" W, 11 May 2005, M. S. Rocha col. (INPA 859); Xiborena and Pirapora channel, 03°09'27" S

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59°55'27" W, 18-19 July 2005, D. M. Pimpão et al. col. (INPA 866); Catalão lake, 03°09'47" S 59°54'30" W, 14 June 2004, D. C. Fettuccia col. (INPA 541, INPA 543); 15 June 2004, D. C. Fettuccia col. (INPA 540, INPA 542); 19 June 2006, D. M. Pimpão et al. col. (INPA 1084).

Family Corbiculidae Gray, 1847

*Corbicula fluminea* (Müller, 1774). Diagnosis: small shell (2 cm length, 2 cm height), thick, triangular shape. Dorsal edge curved. External surface having concentric lines covering the whole surface, large and spaced; yellow to light brown color. Umbones not too low, inflated and preserved. Deep umbonal cavity. Hinge with cardinal and lateral teeth; laterals anterior and posterior equally elongated. Easily distinguished from indigenous species by external surface concentric lines. BRAZIL, Amazonas, Iranduba, Catalão, right bank of Negro river, 03°08'54" S 59°55'06" W, 07 October 2006, D. M. Pimpão & M. S. Rocha col. (INPA 1120); 03°08'56.3" S 59°55'04.7" W, 31 October 2005, D. M. Pimpão col. (INPA 916); 07 November 2005, D. M. Pimpão col. (INPA 923); 08 November 2005, D. M. Pimpão col. (INPA 933, INPA 935); Catalão lake margins, 03°08'56.3" S 59°55'04.7" W, 08 October 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 907); 07 November 2005, D. M. Pimpão & D. C. Fettuccia col. (INPA 924); Xiborena channel, 03°09'08.0" S 59°55'24.7" W, 08 November 2005, D. M. Pimpão col. (INPA 931).

**Results and discussion**

A total of 331 bivalve shells, 25 valves and 57 live specimens belonging to four families and 10 species (Table 1) were recorded for the Catalão region. Mansur and Valer (1992) registered three families and 10 bivalve species from the Branco and Uraricoera rivers, state of Roraima, northern Brazilian Amazon. Pimpão (2007), recorded 13 taxa of freshwater mussels from the Aripuanã river, a tributary of the Madeira river. The species richness of each family in the Catalão survey was: Mycetopodidae (five species), Hyriidae (three species), Sphaeriidae and Corbiculidae (one species each). One of the species collected in the Catalão area was *Corbicula fluminea*, an exotic species, which represented more than half of the collected bivalve shells.

All freshwater mussels, with the exception of *Eupera simoni* (Figure 10), were collected during the dry season, when live specimens and empty shells were more accessible. However, as *E. simoni* can be found in floating substrates such as dead tree trunks and *Eichhornia* spp., this was the only species collected during high water. Future surveys in Catalão with objectives to sample a largest number of freshwater bivalves species must include low water season. It is due to the great variation of the water level in the rainy season and difficulties of using benthos samplers to reach bivalves on the bottom. The presence of trees and roots prevents the use of trawl nets and the low visibility and great depth do not allow a secure diving.

**Table 1.** Freshwater mussels collected from the Catalão region, municipality of Iranduba, Amazonas, Brazil, between 2004 and 2006. A, live specimen; S, empty shell; V, valve.

| Order | Family | Species | Record | Figure |
|---|---|---|---|---|
| Unionoida | Mycetopodidae | *Anodontites elongatus* | A, S | 2 |
| | | *Anodontites trapesialis* | A, S, V | 3 |
| | | *Anodontites ensiformis* | V | 4 |
| | | *Mycetopoda siliquosa* | S, V | 5 |
| | | *Leila esula* | S, V | 6 |
| | Hyriidae | *Prisodon obliquus* | S, V | 7 |
| | | *Castalia ambigua* | A, S, V | 8 |
| | | *Triplodon corrugatus* | S | 9 |
| Veneroida | Sphaeriidae | *Eupera simoni* | A, S | 10 |
| | Corbiculidae | *Corbicula fluminea* | A, S, V | 11 |

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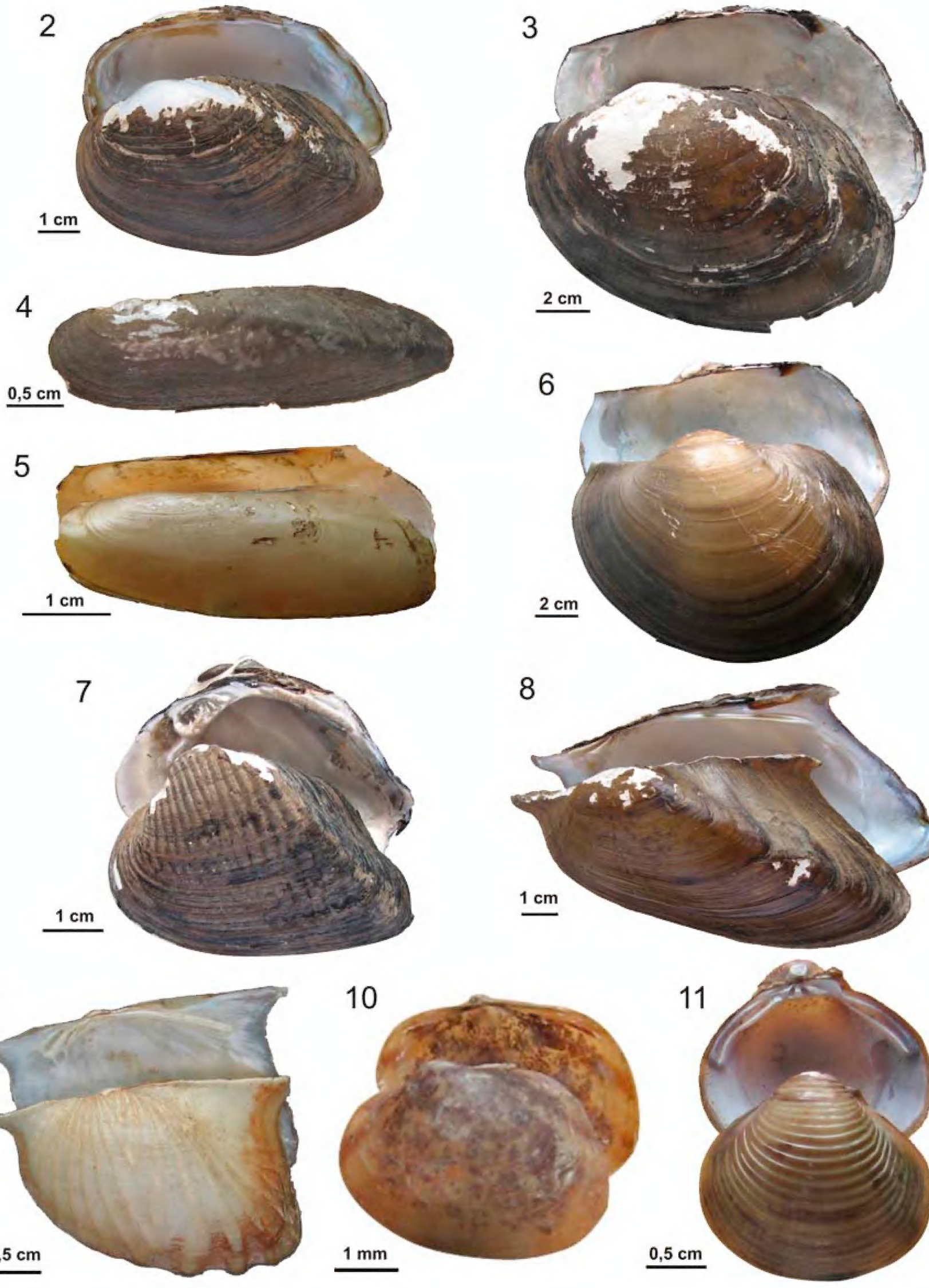


**Figures 2 - 11.** Bivalve shells collected from the Catalão region. 2. *Anodontites elongatus* (Swainson, 1823). 3. *Anodontites trapesialis* (Lamarck, 1819). 4. *Anodontites* (*Lamproscapha*) *ensiformis* (Spix, 1827), left valve. 5. *Mycetopoda siliquosa* Spix, 1827. 6. *Leila esula* (Orbigny, 1835). 7. *Castalia ambigua* Lamarck, 1819. 8. *Prisodon obliquus* Schumacher, 1817. 9. *Triplodon corrugatus* (Lamarck, 1819). 10. *Eupera simoni* (Josseaume, 1889). 11. *Corbicula fluminea* (Müller, 1774).

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